(19) JAPANESE PATENT OFFICE (JP)
(12) PATENT JOURNAL (A)
(11) KOKAI PATENT APPLICATION NO. HEI 4[1992]-304640

(43) Publication Date: October 28, 1992

# (54) SEMICONDUCTOR DEVICE AND ITS MANUFACTURING METHOD

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(51) Int. Cl.[5]: H 01 L 21/321
H 01 L 21/92
Sequence Nos. for Office Use: 9168-4M
(21) Application No.: Hei 3[1991]-68265
(22) Application Date: May 1, 1991
No. of Claims: 3 (Total of 3 pages)
Examination Request: Not requested
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[There are no amendments to this patent.]

Abstract

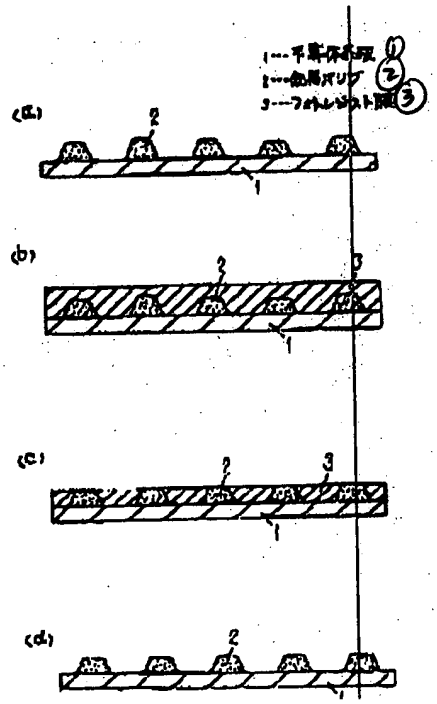
Objective

To offer a manufacturing method for a semiconductor device having metallic bumps with a uniform height in which close adhesion with the semiconductor substrate is good.

Constitution

A photoresist film (3) is coated at a high thickness on top of a semiconductor substrate (1) on which metallic bumps (2) are formed until said metallic bumps (2) are completely covered, then heat treated. The photoresist film (3) and the metallic bumps (2) are then

physically ground until the metallic bumps (2) are made a uniform prescribed height. As a result, the metallic bumps (2) with a uniform height are formed without damaging the close adhesion with the semiconductor substrate (1).



Key 1 Semiconductor substrate
2 Metallic bump
3 Photoresist film

CLAIMS

1. A manufacturing method for a semiconductor device, characterized in that it has at least one process wherein a photoresist film is thickly coated on top of a semiconductor substrate on which metallic bumps are formed until the above-mentioned metallic bumps are covered, then heat treated, as well as a process wherein that photoresist film and the above-mentioned metallic bumps are physically ground until those metallic bumps reach a prescribed height.

2. A manufacturing method for the semiconductor device mentioned in Claim 1, wherein an organic resin film is used in place of the photoresist film.

3. A semiconductor device wherein a number of metallic bumps are formed on top of a semiconductor substrate, with an organic resin film having a height lower than the height of those metallic bumps being coated between those metallic bumps.

DETAILED EXPLANATION OF THE INVENTION

[0001]

INDUSTRIAL FIELD OF THE APPLICATION

This invention relates to a manufacturing method for a semiconductor device having metallic bumps that are necessary during the assembly of a TCP (tape carrier package), COB (chip on board), COG (chip on glass), and the like.

[0002]

PRIOR ART

In the past, as for the height of this type of metallic bump, because variations were generated, certain range standards were provided. At the time of metallic bump plating for the purpose of suppressing variations, a distribution of the electric field was devised by increasing the number of cathode electrodes so as to prevent electrical field concentration; in the case of a jet type of plating device, a rectifier plate was provided between small holes within the device cathode so as to make the plating current uniform in relation to the wafer.

[0003]

PROBLEMS TO BE SOLVED BY THE INVENTION

In this type of manufacturing method for a semiconductor device used in the past, for example, in metallic bump plating, even when the number of cathode electrodes was increased, the portion that contacted the wafer concentrated the electric field; in the case of a jet-type plating device, even when a rectifying plate was provided, as for the plating that ensued, there was no change in the turbulence conditions. It was thus said that when the current amount was decreased the bump growth speed became slow and there was no advantage to the jet-type plating device. In this way, neither method became a decisive solution.

[0004]

This invention solves these problems; its objective is to offer a manufacturing method for a semiconductor device having metallic bumps with a uniform height.

[0005]

MEANS FOR SOLVING THE PROBLEMS

In order to achieve this objective, the manufacturing method for a semiconductor device of this invention consists of a process that coats a photoresist film on a semiconductor surface substrate on which metallic bump electrodes are formed, as well as a process that physically grinds the above-mentioned photoresist film and metallic bumps until the above-mentioned metallic bumps reach a prescribed height.

[0006]

FUNCTION

By means of this invention, a photoresist coating is conducted before the grinding; by grinding until the irregularities generated by the metallic bumps are eliminated, the height of the metallic bumps can be made uniform without damaging either the close adhesion of the metallic bumps and the semiconductor substrate, or the metallic bump shape.

[0007]

APPLICATION EXAMPLES

Below, an explanation is given in regard to application examples of this invention with reference to the figures.

[0008]

Figures 1(a) to (d) show cross-sectional views of the process sequence of the method related to this invention. First, as shown in this same figure (a), the metallic bumps (2) are formed on the semiconductor substrate (1).

[0009]

Next, as shown in Figure 1(b), the photoresist film (3) is coated on the semiconductor substrate (1) including the metallic bumps (2); it is then heat-treated, and the photoresist film (3) is cured. The photoresist film (3) is coated to a thickness so as to sufficiently cover the metallic bumps (2), eliminating the steps of the metallic bumps (2).

[0010]

Next, when the metallic bumps (2) and the photoresist film (3) are ground with a wafer grinding device to reach the desired height of the metallic bumps (2), the height of the metallic bumps (2) becomes uniform, as is shown in Figure 1(c). Afterwards, the photoresist film (3) is peeled, and metallic bumps (2) in which the height is uniform, as in Figure 1(d), are obtained.

[0011]

In this way, according to the method of this invention, height variation of the metallic bumps (2) is completely suppressed. As shown in Figure 2, in place of the photoresist film (3), another organic resin film (4) is used; in the peeling of the organic resin film (4) after grinding, an organic resin film (4) with an arbitrary height remains, and can be used as is for passivation of the semiconductor substrate (1).

[0012]

EFFECTS OF THE INVENTION

As in the above, since this invention has at least one process that coats a photoresist film on a semiconductor substrate surface on which metallic bump electrodes are formed, as well as a process that physically grinds that photoresist film and the above-mentioned metallic bumps until those bumps reach a prescribed height, it can offer a semiconductor device having metallic bumps with a uniform height without damaging either the close adhesion of the metallic bumps to the semiconductor substrate or the shape of the bumps.

## BRIEF DESCRIPTION OF THE DRAWING

Figure 1 is a cross-sectional process views for the manufacturing method for a semiconductor device in one application example of this invention.

Figure 2 is a cross-sectional view of one process in a manufacturing method for a semiconductor device in another application example of this invention.

## EXPLANATION OF THE SYMBOL

1. Semiconductor substrate
2. Metallic bumps
3. Photoresist film

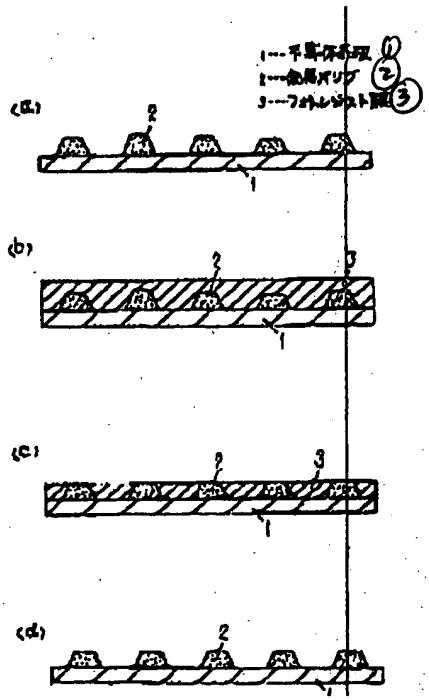


Figure 1

Key: 1 Semiconductor substrate
2 Metallic bumps
3 Photoresist film

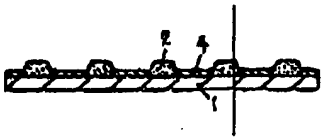
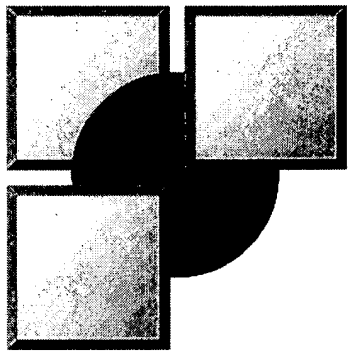


Figure 2



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Japanese Kokai Patent Application No. Hei 4[1992]-304640

RWS Translation Solutions Number: 27-1548

Translated from Japanese into English